BEFORE THE

PUBLIC SERVICE COMMISSION OF

SOUTH CAROLINA

DOCKET NO. 2019-224-E
DOCKET NO. 2019-225-E

In the Matter of:	)	
	)	
South Carolina Energy Freedom Act (House Bill 3659) Proceeding Related to S.C. Code Ann. Section 58-37-40 and Integrated Resource Plans for Duke Energy Carolinas, LLC and Duke Energy Progress, LLC	)))))	**DIRECT TESTIMONY OF LEON BRUNSON ON BEHALF OF DUKE ENERGY CAROLINAS, LLC AND DUKE ENERGY PROGRESS, LLC**
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I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Leon Brunson and my business address is 550 South Tryon, Charlotte, NC.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy Business Services, LLC as a Lead Load Forecast Analyst for the Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP," together with DEC, the "Companies" or "Duke Energy") service areas.

Q. PLEASE DESCRIBE YOUR CURRENT RESPONSIBILITIES AS LEAD LOAD FORECAST ANALYST.

A. I am part of the load forecast team responsible for producing the load forecast for the DEC and DEP service areas.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I graduated from the University of South Carolina, in Columbia, South Carolina, with a Bachelor of Science degree in Economics and a Master of Arts degree in Economics.

Q. PLEASE SUMMARIZE YOUR WORK EXPERIENCE.

A. I joined Duke Energy in 2013 as a lead load forecaster for the Duke Energy Ohio and Duke Energy Kentucky service areas, for which I was responsible for the electric load forecasts as well as the gas design day forecasts for those jurisdictions. In 2017, I became part of a team responsible for developing the load forecasts for the DEC and DEP service areas. Prior to onboarding at Duke Energy, I was employed by the Exelon Corporation from 2005 to 2013, where I was responsible for the electric and gas load forecast and gas design day forecasts for the Baltimore metropolitan service area.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA ("COMMISSION")?

A. No.

Q. ARE YOU INCLUDING ANY EXHIBITS IN SUPPORT OF YOUR TESTIMONY?

A. Yes. I am sponsoring Brunson DEC/DEP Exhibit 1, which contains load forecast data described below.

Q. WAS THIS EXHIBIT PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes. This exhibit was prepared by me or at my direction and under my supervision.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide an overview of the load forecasting process, and a summary of the DEC and DEP load forecasts provided in the 2020 Integrated Resource Plans ("IRPs").

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. In my testimony, I describe the Spring 2020 forecast which informs the Companies on their customers' electricity needs over the planning horizon of 2021 to 2035. I also explain the development of the sales forecasts and growth rates for residential, commercial, and industrial customers. My testimony also describes how weather impacts were incorporated into the forecasts, provides an overview of the peak demand forecast process, and explains the factors driving the lower DEC and DEP peak forecast. Finally, I describe the Companies' load forecast process, and how it has evolved and improved over time.

II. LOAD FORECAST OVERVIEW

Q. WHY ARE FORECASTS AN IMPORTANT COMPONENT OF AN IRP?

A. The load forecast provides the best information on future electric energy and peak demand growth, which informs the planning and decision-making process in every part of the IRP. The load forecast growth helps determine how much and what type of generation, transmission, and distribution resources the utility will need to serve its customers over the forecast horizon. The load forecast is also instrumental in determining future energy savings that are economically feasible and achievable. Resource adequacy and system reliability is an important pillar of the IRPs, of which the load forecast is a primary input. The load forecast helps ensure that required federal and state environmental policies and desired new technologies are accounted for in the IRPs. Finally, the provision of load forecast information as part of the IRP is consistent with the requirement at S.C. Code Ann. § 58-37-40(B) that IRPs include "a long-term forecast of the utility's sales and peak demand under various reasonable scenarios."

Q. WHAT FORECAST DID THE COMPANIES USE IN DEVELOPING THE 2020 IRPs?

A. The Companies relied upon their respective Spring 2020 forecast, which provide projections of the energy and peak demand needs for the DEC and DEP service areas. The forecast covers the time period of 2021 to 2035 and represents the electricity needs of the residential, commercial, industrial, street lighting, and wholesale customers. The electric load forecasts are described in detail in Appendix C to the IRPs.

Q. HOW DID THE COMPANIES DEVELOP THE ENERGY PROJECTIONS RELIED UPON IN THE IRP LOAD FORECASTS?

A. Energy projections were developed with econometric models using key economic factors such as income, electricity prices, industrial production indices, along with weather, appliance efficiency trends, rooftop solar trends, and electric vehicle trends. Population is also used in the residential customer model.

Q. HOW DID THE COMPANIES DEVELOP THE ECONOMIC PROJECTIONS RELIED UPON IN THE IRP LOAD FORECASTS?

A. The economic projections used in the Spring 2020 Forecast are obtained from Moody's Analytics, a nationally recognized economic forecasting firm, and include economic forecasts for the states of South Carolina and North Carolina. Moody's forecasts consist of economic and demographic projections, which are used in the energy and demand models.

Q. WAS THE COVID-19 PANDEMIC INCLUDED AS PART OF THE LOAD FORECAST MODELING?

A. The Spring 2020 forecast was developed using Moody's economic inputs as of January 2020. Therefore, the disruptions experienced due to COVID-19 are not incorporated in this forecast. Additionally, as explained in more detail below, based on summer 2020 demand observations to date, it appears that the COVID-19 impact to peak demand is relatively insignificant. We will, however, continue to evaluate the impacts, and update future forecasts for expected impacts.

Q. WHY DO YOU BELIEVE THE LONGER-TERM IMPACTS OF THE COVID-19 PANDEMIC WILL BE RELATIVELY INSIGNIFICANT?

A. Due to the novel nature of the coronavirus pandemic, there is no clear historical precedent on its economic impact in relation to energy usage. However, the performance of DEC and DEP 2020 energy sales through September and 2020 summer peak demand provides important insight into the future impact of COVID-19 on energy sales and peak demand. DEC and DEP year-to-date retail sales trends mirrored the general economy, with sales falling sharply during the shut-down periods between March and May 2020, before rapidly recovering once businesses began returning to normal or near-normal operations. As of September 2020, DEC year-to-date annual retail sales were 3.0% lower, while DEP year-to-date annual retail sales were 2.5% lower. At the same time, a preliminary estimate of summer peak demand indicates that 2020 weather-adjusted summer peak demand met or exceeded forecast expectations developed prior to the COVID-19 pandemic. DEP summer peak demand came in as expected, while DEC summer peak demand came in 2.9% above expectations. These results indicate that peak demand, the most essential part of the load forecast, is less sensitive to negative shocks to the economy than kilowatt-hour energy sales. This reveals that households and businesses will continue to demand electricity to operate their homes and businesses during peak weather periods despite the unusual circumstances and challenging economics associated with the pandemic.

It is worth noting that the IRPs look forward over a fifteen-year planning horizon, and that the load forecast is refreshed each year with the latest economic assumptions. Any future forecast series from Moody's for the 2021 IRPs will have an additional year of data with underlying assumptions of how the pandemic, government policy, and other factors will impact the economy going forward, resulting in a set of assumptions informed by the pandemic and associated effects, compared to forecasts from the beginning of the pandemic. While 2020 was an unusual year, at this time, the Companies are not aware of any long-term trends indicating that the COVID-19 pandemic will have a significant impact over the IRPs' fifteen-year planning horizon. Nevertheless, Load Forecasting is continuing to monitor summer and winter peak load as more information becomes available.

Q. WHAT IS THE RESIDENTIAL SALES FORECAST COMPRISED OF AND HOW WAS IT DERIVED?

A. The Residential sales forecast is comprised of two projections. The first is the number of residential customers, which is driven by population. The second is energy usage per customer, which is driven by weather, regional economic and demographic trends, electricity prices, and appliance efficiencies. The usage per customer forecast was derived using a Statistical Adjusted End-Use Model ("SAE"). This is a regression-based framework that uses projected appliance saturation and efficiency trends developed by Itron using Energy Information Administration ("EIA") data. It incorporates naturally occurring efficiency trends and government mandates more explicitly than other models. The outlook for usage per customer is essentially flat through much of the forecast horizon, so most of the growth is primarily due to customer increases. See page 215 of the DEP IRP and page 224 of the DEC IRP.

Q. WHAT IS THE RESIDENTIAL FORECASTED GROWTH RATE PER YEAR?

The average annual growth rate of Residential energy sales in the Spring 2020 forecast, including the impacts of Utility Energy Efficiency ("UEE") programs, rooftop solar, and electric vehicles from 2021-2035 is 1.0% for DEC and 1.4% for DEP. These energy sales growth rates are reflective of a 1.5% average annual growth rate for DEC residential customers and a 1.2% average annual growth rate for DEP residential customers over the 15-year forecast period. 2019 residential customer growth, a primary driver in residential sales growth for both DEC and DEP, was 2.1% and 1.4% respectively.

Q. WHAT IS THE COMMERCIAL SALES FORECAST COMPRISED OF AND WHAT IS THE COMMERCIAL FORECASTED GROWTH RATE PER YEAR?

A. The three largest sectors in the Commercial class are offices, education, and retail. The Commercial forecast also uses an SAE model to reflect naturally occurring as well as government-mandated efficiency changes. Commercial energy sales are expected to grow 0.5% per year for DEC and 0.2% per year for DEP over the 15-year forecast period. Data centers are a primary growth driver in DEC. Both DEC and DEP commercial sectors are negatively impacted by the continuing trend of online sales versus big-box retail sales. Some of this decline is partially offset by the emergence of large distribution centers, which support large online retailers.

Q. WHAT IS THE INDUSTRIAL SALES FORECAST COMPRISED OF AND WHAT IS THE INDUSTRIAL FORECASTED GROWTH RATE PER YEAR?

A. The Industrial class is forecasted by a standard econometric model, with drivers such as total manufacturing output and the price of electricity. Overall, Industrial sales are expected to decline 0.2% per year for both DEC and DEP. Both DEC and DEP continue to lose large traditional industrial customers to global competition and to advances in technology.

Q. HOW WERE WEATHER IMPACTS INCORPORATED INTO THESE FORECASTS?

A. Weather impacts are incorporated into the energy models using daily weather data from the National Oceanic Atmospheric Administration ("NOAA"). Weather data is converted into Heating Degree Days with a base temperature of 59 and Cooling Degree Days with a base temperature of 65. This projection of normal weather is based on a 30-year average, which is updated every year. Weather impacts are also incorporated into the peak demand models, using peak daily temperatures from NOAA. Similar to the energy weather process, weather data is converted into Heating Degree Days with a base temperature of 59 and Cooling Degree Days with a base temperature of 65. The projection of peak normal weather is developed using a rank-average methodology based on 30 years of peak weather, which is updated every year.

Q. HOW WERE PEAK DEMANDS PROJECTED?

A. Peak demands were projected using the SAE approach. The peak forecast was developed using a monthly SAE model, similar to the sales SAE models, which includes monthly appliance saturations and efficiencies, interacted with weather and the fraction of each appliance type that is in use at the time of monthly peak.

Q. WHY IS THE 2020 LOAD FORECAST UPDATE LOWER THAN THAT WHICH WAS IN THE 2019 IRP?

A. The decrease in the 2020 load forecast update is primarily driven by refinements to peak history, the addition of 2019 peak history, and declines in Commercial and Industrial energy sales. The 2020 update also includes revised projections for rooftop solar and electric vehicle programs and the impacts of voltage control programs. The key economic drivers are shown in Tables 3-A of the DEC and DEP IRPs, which are also included as Table 1 within Brunson Exhibit 1.

III. KEY INPUTS TO THE LOAD FORECASTS

Q. HOW HAS THE LOAD FORECAST MODEL EVOLVED OVER TIME?

A. The Companies began using the SAE model projections in 2013 to forecast sales and peaks. The end use models provide a better platform to recognize trends in equipment and appliance saturation, changes to efficiencies, and how those trends interact with heating, cooling, and "other" or non-weather-related sales. These appliance trends are used in the residential and commercial sales models. In conjunction with peer utilities and Itron, the Companies continually look for opportunities to refine its modeling procedures to make better use of the forecasting tools and develop more reliable forecasts. See page 216 of the DEP IRP and page 225 of the DEC IRP.

Q. WHAT HISTORICAL AND PROJECTED DATA DID THE COMPANIES USE FOR THE LOAD FORECASTS IN THESE IRPS?

A. The Companies utilized the following:

- Moody's Analytics January 2020 base and consensus economic projections;
- End use equipment and appliance indexes reflect the 2019 update of Itron's end-use data, which is consistent with the Energy Information Administration's 2019 Annual Energy Outlook; and
- A calculation of normal weather using the period 1990-2019.

The Companies also researched the weather sensitivity of summer and winter peaks, peak history, hourly shaping of sales, and load research data in a continuous effort to improve forecast accuracy. As a result of continuous improvement efforts, refinements to peak history were identified during the Spring 2020 update, which lowered peak history. Peak history is a key driver in the peak forecast, thus the revisions also contributed to the decrease in the peak forecast.

Q. HOW ARE UTILITY ENERGY EFFICIENCY ("UEE") PROGRAMS ACCOUNTED FOR IN THE IRPS' LOAD FORECAST?

A. UEE programs continue to have a large impact in the acceleration of the adoption of energy efficiency. When including the energy and peak impacts of UEE, careful attention must be paid to avoid the double counting of UEE efficiencies with the naturally occurring efficiencies included in the SAE modeling approach. To ensure there is not a double counting of these efficiencies, the forecast "rolls off" the UEE savings at the conclusion of its measure life. For example, if the accelerated benefit of a residential UEE program is expected to have occurred 7 years before the energy reduction program would have been otherwise adopted, then the UEE effects after year 7 are subtracted ("rolled off") from the total cumulative UEE. With the SAE model's framework, the naturally occurring appliance efficiency trends replace the rolled off UEE benefits serving to continue to reduce the forecasted load resulting from energy efficiency adoption. The UEE Program Life Process is shown in Table C-2 of the IRPs.

Q. HOW ARE ROOFTOP SOLAR AND ELECTRIC VEHICLES ("EV") ACCOUNTED FOR IN THE IRPs' LOAD FORECAST?

A. As discussed in more detail in Witness Kalemba's direct testimony, behind-the-meter solar PV generation reduces the effective load that Duke Energy serves, while plug-in EV charging increases load on the system. Rooftop solar generation and EV load are forecasted independently and then combined with base load and UEE impacts to produce the final electric load forecast. Impacts from existing rooftop solar and EVs are embedded in the historical data that the base load forecast is derived from. Therefore, forecasts for rooftop solar and EVs include impacts from only incremental or "net new" resources projected to be added within the planning horizon. The impacts are presented in the IRPs at page 220 through 223 of the DEP IRP and at page 230 through 232 of the DEC IRP.

Q. COMPARE THE RESIDENTIAL CUSTOMER AND SALES GROWTH RATES FOR HISTORICAL YEARS 2010 TO 2019 WITH THE IRP FORECASTS.

A. DEC's forecasted average annual residential sales growth is 1.0%, noticeably higher than its most recent 10-year historical growth average of -0.4%. DEP's forecasted average annual residential sales growth is also noticeably higher at 1.4%, compared to 0.7% historically. Annual average forecasted customer growth is expected to meet or exceed historical growth for both jurisdictions: 1.5% from 1.2% for DEC; and a constant 1.2% for DEP. Both jurisdictions will benefit from changing population and family formation dynamics midway into the forecast planning period, with DEC benefiting more due to its heavier concentration of households in metropolitan areas. Residential usage is expected to decline less in DEP, due to the jurisdiction's lack of natural gas as a winter heating source. These figures are provided in more detail in Tables C-6 through C-9 of the IRPs and in Tables 2 and 3 of Brunson Exhibit 1.

Q. COMPARE THE COMMERCIAL CUSTOMER AND SALES GROWTH RATES FOR HISTORICAL YEARS 2010 TO 2019 WITH THE IRP FORECASTS.

A. DEC's forecasted average annual commercial sales growth is 0.5%, slightly lower than its historical growth at 0.6%. DEP's forecasted average annual commercial sales growth 0.2% is also slightly lower than its historical growth of 0.3%. The slight decline in both jurisdictions are being driven by the permanent closures of big-box retail stores in both jurisdictions, which is evident by a comparison of historical and forecasted commercial customer growth (0.9% to 0.4% for DEC, and 1.0% to 0.4% for DEP). DEC's larger sales growth can also be attributed to having data centers in its portfolio, where DEP has none. These figures are provided in more detail in Tables C-6 through C-9 of the IRPs and in Tables 2 and 3 of Brunson Exhibit 1.

Q. COMPARE THE INDUSTRIAL CUSTOMER AND SALES GROWTH RATES FOR HISTORICAL YEARS 2010 TO 2019 WITH THE IRP FORECASTS.

A. DEC's forecasted average annual Industrial sales growth is expected to decline by 0.2% compared to growth of 0.4% historically. DEP's forecasted average annual industrial sales growth will also decline by 0.2%, compared to growth of 0.2% historically. Industrial usage continues to decline in both jurisdictions due a continued decline in industrial customers, resulting in a smaller industrialized footprint. These figures are provided in more detail in Tables C-6 through C-9 of the IRPs and in Tables 2 and 3 of Brunson Exhibit 1.

Q. SUMMARIZE THE 2020 IRP PEAK LOAD FORECASTS AND THE DISCUSS THE PRIMARY FACTORS DRIVING THE LOWER FORECASTS COMPARED TO THE 2019 IRP.

A. Both DEC and DEP 2020 IRP peak load forecasts have lower peak levels compared to the 2019 forecast, and DEC has slower growth rate compared to its 2019 forecast. The following factors attributed to the lower peak load forecasts for both jurisdictions:

1. Lower 2019 actual peaks, due to an historically mild 2019-20 winter, and lower demand in the nonresidential sectors.

2. Lower economic growth assumptions compared to the 2019 forecast. Lower projections for population, households, industrial production, and employment all contribute to lower peak forecast.

3. Voltage control assumptions are an additional constraint to peak load growth in the forecast.

4. Continuous improvement in the Load Forecasting process: The Load Forecasting team continuously looks for ways to improve the load forecasting process. Process changes can be driven by new industry methodologies, internal or external inquiries or requests about peak load, and the changing assumptions and emerging issues around the load forecast. Between the 2019 and 2020 IRPs, an internal review revealed corrections needed in the load forecast associated with retail line losses and revisions needed to retail load and demand response initiatives, as well as ensuring the exclusion of wholesale contracts. Load Forecasting enhanced its processes by developing an internal accounting system, which is now used to validate the system load definitions going forward, and these corrections and processes have been incorporated into these IRPs.

The 2020 peak demand forecast is provided in more detail in Tables C-11 and C-12 of the IRPs. A summary comparison of the 2020 and 2019 peak demand forecast is provided in Table 4 of Brunson Exhibit 1.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes. It does.